

The Planters' Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

Contents.

Mr. Anstead, Scientific Officer, has gone on leave to Kotagiri for ten days and will not return till the 1st proximo, but all letters will be forwarded to him and will be attended to.

The Scientific Department publishes an analysis of two samples of Fish Manure.

That Green Bug is spreading is an unfortunate fact but the monsoon setting in will no doubt check it, and planters should be prepared with Sprayers to continue the work after the monsoon. One source of infection has been traced to the gourds grown by natives, but the Planting Expert is not resting in his investigation as to the original cause in Mysore.

We publish a letter from Messrs. Peirce, Leslie & Co., Ltd., Calicut, which, at the present moment, will draw attention to Sprayers. This firm believe that an unintentional injustice (where none was intended) was done them in our article on "Green Bug." The Planting Expert in that article rightly drew attention to the lack of sprayers, at the time he wrote, in Southern India and made no mention of any firms. At such a critical moment the Planting Expert exercised a sound and wise judgment in drawing attention to the melancholy fact that so few sprayers could be procured nearer than Calcutta, which has had the effect of causing these now absolutely necessary articles to be stocked in quantity in the near future.

We publish the minutes of two District Planters' Association.

At the time when the Tea season is commencing we think it advisable, to reach the individual Tea planter, to publish Circular 15 from Indian Tea Association dealing with the despatch of samples by post and also those sections of the Post Office Guide giving the method of despatching.

Some interesting experiments in manuring on a Tea Estate in Darjeeling are reproduced. From the tabular statement accompanying them, it will be seen how prohibitive chemical manures are, and the good results obtained from green manuring. It will be noted that it is the cost of transport in Darjeeling that makes the use of chemical manures so costly.

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

Fish Manure Two samples of Fish Manure have been analysed in the Scientific Department Laboratory during the past week with the following results:—

	1	2
Loss on Ignition	69'53	61'30
Nitrogen	7'06	5'38
Sand	6'41	19'90
Soluble Ash	24'06	18'80
Phosphoric Acid	9'33	6'64

The first is a high grade Fish Manure, and though the Sand content is on the high side, it is reasonable. The second is very inferior stuff containing a large amount of useless Sand and a low Nitrogen content.

The second sample was of interest as it contained a number of beetles and their larvae. Specimens were sent to the Government Entomologist, who identified them as *Dermestes vulpinus* and *Necrobis rufipes*. Both beetles occur commonly in Fish Manure and since they feed on it they must reduce its value to a certain extent, but unless the manure is stored for a very long time the actual loss is probably negligible.

Lefroy figures and describes both these beetles in his "Indian Insect Life." The *Dermestidae* are a group of small beetles, some of which are household pests. The larvae, which characterised by the development of tufts of long hairs, are predaceous, or feed on dried animal matter like skins, horns, fish, &c. The length of the life history is not known, but it can be very greatly extended in every stage if food is scarce. *Dermestes vulpinus* appears to be a silk industry pest, as its larvae feed on the cocoons of the silk worms eating through the silk to reach the pupa within.

Necrobis Rufipes belongs to the *Cleridae* a large family of small brightly coloured beetles commonly found in the open on flowers, trees, grass, and carcasses, &c. It is a household pest feeding on animal products.

Green Bug.—In the infected area in Mysore the rainfall has been short and the weather has been all in favour of the pest which has shown an increase on unpruned areas. Spraying, however, has been continued with success. It is almost impossible to spray big unpruned trees properly and it will probably be found that heavy pruning will have to be the first step in any really practical scheme for controlling the scale. It is almost certain too that an after monsoon spraying will be necessary. The main object of spraying is to kill the scales before they reach maturity and are able to lay eggs so that two successive sprayings at short intervals are apt to do more good than one spraying or treatment at long intervals. One spraying will not absolutely clean up an unpruned tree, but a second one, after an interval of a fortnight, will clean it up.

With regard to the source of the infection a valuable discovery has been made which throws a good deal of light upon the mystery and probably indicates the direction of the ingress of the scale. The native gourds which are grown on 'chupras' in every village and lines have been infected with a scale which is in all probability Green Bug. This plant is cut down every year or so and thrown on to the manure heap and it seems more than

likely that this is one source of infection, as this bulk is always carted into the estates and always put to stucco coffee on which the Bug would get an easy hold.

Accumulation of Nitrogen in the Soil by Micro-Organisms.—Some recent work on this subject by Mr. J. Dvorak shows that the fixation of nitrogen in the soil by micro-organisms is of great importance. Carbo-hydrates supply assimilating bacteria with the necessary energy, and experiments in nutritive solutions with some vegetable substances which frequently come into contact with the soil and contain carbo-hydrates which can be utilised by bacteria lead to the conclusion that the older the vegetable matter the richer it becomes in ligno-cellulose and, consequently, the less it is adapted as nutriment for the bacteria. On the other hand green stuff, and in a lesser degree roots and straw, contain compounds which are easily changed into substances adopted to consumption by bacteria. There are other micro-organisms in the soil which prepare nutritive material for the nitrogen fixing bacteria, and there is a whole series of enzymes that render the carbo-hydrates soluble. Of all the substances tried, green stuff was the best nutritive medium for the development of bacteria. In it they find in favourable proportions carbo-hydrates and nitrogen, and in addition to this the carbo-hydrates are in a form which is more easily transformed by the enzymes contained in the bacteria themselves. Consequently green manuring increases the activity of bacteria, it causes a more intense respiration, and it raises the temperature of the soil, while the greater development of Carbon dioxide favours the porosity of the soil, and, in solution in water facilitates the disintegration of the insoluble phosphates and silicates.

Rubber from Malay.—The following are the official statistics of the export of plantation Rubber from the Federated Malay States during 1911-1912 given by the Board of Trade:—

	1911.	1912.
Total ...	19,693,330	34,718,015

Camphor.—The following table published in the *Chemist and Druggist* of March 29th shows the exports of crude and refined Camphor from Japan and Formosa during the past three years:—

Destination.	1910.	1911.	1912.
	Kin.	Kin.	Kin.
Hong-Kong ...	13,095	30,776	22,260
British India ...	432,881	570,714	643,745
Straits Settlements ...	4,973	8,146	9,814
Great Britain ...	657,838	657,657	724,250
France ...	872,534	795,893	502,996
Germany ...	357,024	520,387	489,317
United States ...	789,467	705,713	456,641
Canada ...	12,100	11,642	21,433
Australia ...	53,616	94,279	75,534
Other Countries ...	51,574	47,892	115,603
Kin (=1½ lb.)	3,275,102	3,441,099	3,062,462

R. D. A.

DISTRICT PLANTERS' ASSOCIATIONS.**Mundakayam Rubber Planters' Association.**

Minutes of General Quarterly Meeting of the Mundakayam Planters' Association held at Yendayar Bungalow, on Saturday, May 3rd, 1913, at 10.30 a.m.

PRESENT.—Messrs. G. H. Danvers-Davy (Chairman), R. Harley, (Vice-Chairman), H. J. Byrne, E. S. Bonner, E. R. Gudgeon, C. Byng Hall, Ashton Hamond, H. M. E. Howson, J. V. M. Henderson, R. C. Milbank, J. J. Murphy, M. B. Middleton, H. J. O'Reilly, F. Siminong, J. H. B. Sullivan, and Edwin Vincent (Honorary Secretary). *By Proxy*—Messrs. H. B. Kirk, and Eric Hall.

The Honorary Secretary having read the notice calling the meeting, the Minutes of the last meeting were taken as read.

Business—1. The recommendations of the Scientific Officer Fund Committee were put before the meeting as follows:—

(a.) "That Mr. Eric Hall be requested to withdraw his resignation from the Committee pending the result of correspondence to be exchanged with Messrs. Harrisons and Crosfield, Quilon."

(b.) "That the Association continue its subscription to the U.P.A.S.I. Scientific Department on the same basis as in previous year."

(c.) The Honorary Secretary read a letter from Mr. R. Anstead accepting the invitation of the Association to become an Honorary Member of the Committee of the Scientific Officer Scheme, also a letter from Mr. K. E. Nicol kindly consenting to help the Association in the selection of a suitable officer.

2. The recommendations of the General Committee were next placed before the Meeting, *viz*:—

(a.) **Building Rates.**—It was decided: "That Mr. Harley and Mr. J. R. Vincent be asked to draw up a list of the rates which might be paid under reasonable conditions." Proposed by Mr. J. J. Murphy and seconded by Mr. A. Hamond.

(b.) **Purchase of a Typewriter.**—The Honorary Secretary having pointed out the necessity of a typewriter and duplicating machine, the Committee sanctioned the expenditure of not more than Rs.350 for the typewriter and further suggested the purchasing of a duplicating apparatus. The Honorary Secretary proposed a hearty vote of thanks to Mr. C. B. Hall for having kindly lent his machine during the past year. Seconded by Mr. Henderson and carried unanimously.

(c.) **Finance.**—The Chairman drew attention to the large balance lying to the credit of the Association at the Bank. Mr. Harley proposed and Mr. J. J. Murphy seconded: "That the Secretary invite suggestions as to how the money might most profitably be spent to the benefit of the Association, further that at the General meeting a Finance Committee be elected." This was seconded by Mr. J. J. Murphy.

The Chairman proposed the adoption of the recommendations of the Scientific Officer Committee and the General Committee, which was carried *nem-con*.

3. *Private Membership.*—The Honorary Secretary asked for a ruling as to the election of private members. Mr. Murphy proposed: "That the words 'at the direction of the Committee' be inserted in Rule 7 after the word 'granted' and before the word 'on.'" Seconded by Mr. Hamond and carried unanimously.

4. Mr. R. Harley brought forward a resolution to the effect that the Postmaster-General be approached with a view to the conversion of the Mundakayam Post Office into a First Grade Office. In the course of his remarks Mr. Harley said that the conversion would mean greater facilities for the despatch of telegrams and money-orders as the hours of business would be extended. Mr. Harley mentioned that the money-order business alone at the Mundakayam Post Office totalled from Rs.17,000 to Rs.20,000 per month. The proposal was seconded by Mr. Hamond and carried unanimously.

5. *The Hours of Attendance at Out-Stations.*—In the absence of Mr. Kirk, Mr. Harley proposed that the Honorary Secretary should approach Government on this subject. Mr. Harley pointed out the extreme inconvenience caused to the general public by the variation in the times of duration of office hours at Out-Stations. Mr. Howson seconded the proposal, which was carried unanimously.

Item Nos. 6, 7, 8, 9, and 10.—These were resolutions handed in by Mr. J. R. Vincent and in his absence the Chairman called for the holder of his proxy. The proxy not being forthcoming the Chairman ruled that the discussion of the subject matter of Mr. Vincent's resolutions be held over.

11. *Correspondence.*—Read letter from the Executive Engineer informing the Association that the bridge work on the Lalam-Poenjar Road has been resumed and will be completed for traffic before the monsoon bursts.

Read letter from Mr. J. F. Fraser conveying his thanks to the Association for their vote of condolence in his recent bereavement. Read letter from Mr. R. Harley suggesting the desirability of reserving 1,000 acres of land for grazing purposes at Mundakayam. Also letter from the Superintendent, Devicolum Division, asking the Association to point out where in Mundakayam without encroaching on private property, such selection could be made. Mr. Harley said he thought the land could be reserved on the road to Veilanadi between the 34th and 35th miles. The Chairman said he understood a petition was being extensively signed by cattle owners in Mundakayam for presentation to Government, pointing out the places which would be suitable for the purpose. Mr. Harley said that he was satisfied that Government would act on that petition.

12. The date of the next meeting will be Saturday, August 2nd, 1913, and it will take place, by kind invitation of Mr. H. B. Kirk, at Peruvantbanam Bungalow. Before the close of the meeting Mr. Murphy wished to be placed on record his opinion that the Chairman was not in order in refusing discussion of item Nos. 6, 7, 8, 9 and 10, on the Agenda.

The Meeting then terminated with the usual vote of thanks to the Chairman for presiding and to Mr. Murphy for his hospitality. Proposed and seconded by Messrs. Hamond and Howson.

(Signed) G. H. DANVERS-DAVY,
Chairman.

) EDWIN VINCENT.
Hony, Secretary.

Anamalai Planters' Association.

The Minutes of a Meeting of the General Committee held at the Valparai Bungalow, at 2 p.m. on Monday, April 28th, 1913.

PRESENT.—Messrs. Geo. L. Duncan (Chairman), B. A. Marden, C. R. T. Congreve, and J. Hatton Robinson (Honorary Secretary).

AGENDA.

1. Whether combined action should be taken against a maistry of Mr. Simcock's for deliberately bringing a false charge against Mr. Simcock.
2. To review Messrs. Walker & Sons' Estimate for Aerial Ropeway.
3. Payment to Government for L. F. Hospital.
4. Mr. Marden's resignation as Vice-Chairman.

No. 1. As Mr. Simcock was unable to attend the Meeting, the subject was postponed.

No. 2. Messrs. Walker, Sons & Co.'s rough estimate for proposed Aerial Ropeway was discussed, and the Honorary Secretary was requested to go into figures, and to try and find out what the approximate transport of the district would be in 5 years hence.

These figures, together with copies of Messrs. Walker Son & Co's letter and estimate, to be sent to the various interests, when further action could be taken in the matter.

No. 3. The Meeting noted that Government had written asking that the full subscription for years 1911-12 and 1912-13 be paid.

The Honorary Secretary was requested to write and say that as practically all the subscriptions collected by the Association for the past year were paid under protest by the subscribers, on account of the very unsatisfactory way in which the late Sub-Assistant Surgeon, P. S. David, attended to his duties, and also because of the fact that Government had not fulfilled its promise, and had not built a Hospital, but still kept the Assistant Surgeon in a very small building, lent by one of the members of the Association, not even keeping the necessary hospital staff which would allow the Sub-Assistant Surgeon to do his work more satisfactorily. The Committee considered that Government could not be out of pocket to a very large extent over the L. F. Hospital, and that they were prepared to pay their share of the actual out of pocket expenses incurred by Government over the Hospital.

No. 4. The Meeting very much regretted that Mr. Marden was soon about to leave the district, and had tendered his resignation as Vice-Chairman. Mr. Congreve, as carrying the next greatest number of votes at the Annual General Meeting, will fill the vacancy.

(Signed) GEO. L. DUNCAN,
Chairman.

(Signed) J. HATTON ROBINSON,
Honorary Secretary.

CORRESPONDENCE.

THE EDITOR,

Planters' Chronicle,
Bangalore.

Calicut, 9th May, 1913.

Dear Sir.—With reference to the article on "Green Bug in Mysore" in your edition of the 26th ultimo, we would like to point out a slight injustice to us (we feel sure unintentionally) in the statement that "only three sprayers were available nearer than Calcutta". We had in stock and supplied for use in this present outbreak 6 of our "Antipest" Knapsack Sprayers. We always carry a fair stock of these and under ordinary circumstances can meet all demands.

Yours faithfully,

Per Pro PIERCE, LESLIE & CO., LTD.

(Signed) K. LANGLEY.

Nagalur, Shevaroy's,
14-5-13.

THE SECRETARY,

U. P. A. S. I.,
Bangalore.

Dear Sir.—With reference to our last proceedings published in P. C. 10th:—

(6.) Recruiting in a Plihting District
I shall feel obliged if you will kindly insert the following in this week's P. C.—

"That owing to an oversight Mr. A. B. Kundaswamy's name was omitted in the Sub-Committee. Also that he rendered valuable assistance in translating the circular from English into Tamil."

I am,

Dear Sir,

Yours faithfully,

(Signed) CHAS. DICKINS.

Hon. Secy, S. P. A.

(April 1913.)

TREATING STUMPS WITH CHEMICALS.

Mr. E. T. Bruce, "Rosedale," Inkerman, sends us the following cutting from a New Zealand Journal:—

Bore a hole with 2 inch auger into the stump from the top; into this hole pour the following mixture (a pint for big stump, Nitric acid and sulphuric acid, equal parts. As soon as this is done the hole in the stump must be closed with a well-fitting wood plug. To do this well the plug should be dipped into liquid paraffin first. A stump so treated will be rotten in 30 days, roots and all; it will be a loose mass, and may be shovelled and spread over the land as manure.—*The Queensland Agricultural Journal.*

INDIAN TEA ASSOCIATION.

Royal Exchange Buildings,

Calcutta, 13th May, 1913.

Circular No. 15.

To

(ALL MEMBERS OF THE ASSOCIATION).

INDIAN POST OFFICE: SAMPLE PACKETS OF TEA.

Memo—I am directed to solicit the attention of members of the Association to the subjoined letter from the Postmaster General, Eastern Bengal and Assam Circle, with reference to sample packets of tea. Clauses 178 to 182 of the *Post Office Guide* are printed below.

(Signed) D. K. CUNNISON,
Assistant Secretary.

No. C.A.-370. dated Dacca, 22nd April 1913.

From—The POSTMASTER GENERAL, Eastern Bengal and Assam Circle,

To—The SECRETARY, Indian Tea Association, Calcutta.

I have the honour to say that the tea manufacturing season is about to begin and tea samples will be posted from now onward until the end of December. I beg you will kindly invite the attention of the managers of tea gardens to the necessity of strictly conforming to the conditions laid down in clause 178 to 182 of the *Post Office Guide* when preparing tea samples.

2. It sometimes happens, that the address labels get detached in transit and it would, I think, be a wise precaution if the addresses were written upon the bodies of the packets themselves as well as on the tag labels usually attached.

INDIAN POST OFFICE.

Sample Packets.

178. *Contents and Packing.*—(1) Samples must be *bona fide* samples of merchandise, and must not have any saleable value. They must not bear any writing except the name or the commercial style of the sender, the address of the person for whom they are intended, a manufacturer's or trade mark, numbers, prices and indications relative to weight or measurement and dimensions, or to the quantity to be disposed of, or such as are necessary to determine the origin and the nature of the goods. They may be placed in bags, boxes, or envelopes; but these coverings must be readily removable so as to admit of an easy examination of their contents.

Explanation.—Sample packets of cigars or other tobacco, manufactured or unmanufactured, addressed to countries other than the United Kingdom are regarded by the *Indian Post Office* as having no saleable value when they do not contain more than three cigars or three ounces of tobacco. It should, however, be understood that a different rule may be in force in the country of destination; and senders of sample packets of tobacco must take the risk of having their packets returned, or charged with customs of other dues, when addressed to a country where the rule of the Indian Post Office is not accepted. As regards the transmission of spirits,

tobacco and tea by the sample post to the United Kingdom and certain other countries see the *Foreign Post Directory* included in this book.

(2) Packets containing samples of glass, liquids, oils, fatty substances, dry powders (whether dyes or not) as well as packets of live bees, are admitted to transmission as samples of merchandise, provided that they are packed in the following manner.

(a) Articles of glass must be securely packed (in boxes of metal or wood) in such a way as to prevent all risk of injury to the mails or to the officers of the Post Office.

(b.) Liquids, oils, and fatty substances easily liquified must be enclosed in glass bottles hermetically sealed. Each bottle must be placed in a wooden box furnished with sawdust, cotton, or some spongy material in sufficient quantity to absorb the liquid in case the bottle be broken. Finally, the box itself must be enclosed in a case of metal, or of wood with a screw top, or of strong and thick leather.

Note.—When use is made of perforated wooden blocks of the thickness of at least $\frac{1}{16}$ th of an inch in the weakest part, with a sufficient quantity of absorbent material inside and provided with a cover, the block need not be enclosed in a second case.

(c.) Fatty substances which are not easily liquified, such as ointments, soft soaps, resin, etc., must be enclosed in an inner cover (box, bag of linen or parchment, etc.) which must itself be placed in a second box of wood, metal, or strong and thick leather.

(d.) Dry colouring powders must be placed in bags of leather; rubber-dressed linen, or oiled paper of stout substance, and dry powders, not dyes in boxes of metal, wood, or cardboard. The bags or boxes themselves must be enclosed in a bag of linen or parchment.

(e.) Live bees must be enclosed in boxes so constructed as to prevent all danger and to allow the contents to be ascertained.

(3.) Keys sent singly, fresh-cut-flowers, objects of natural history, dried or preserved animals and plants, geological specimens and other similar objects, as also tubes of serum and pathological objects rendered innocuous by their mode of preparation and packing, are also admitted to transmission at the rates of postage for samples of merchandise, provided that they are not sent for a commercial purpose, and that they are packed in the manner prescribed for samples of merchandise generally.

179. *Postage.*—The postage on a packet of samples for the United Kingdom and for all other countries and places served by the Foreign Post, with the exception of Ceylon and Portuguese India, is half an anna for every two ounces or part of that weight, subject to a minimum charge of one anna for each packet, however small the weight. The postage on packets of samples for Ceylon and Portuguese India, is the same as the postage on inland pattern packets.

180. *Size and Weight.*—In size a sample packet must not exceed 12 inches in length by 8 inches in width and 4 inches in depth, or if it is in the form of a roll, 12 inches in length and 6 inches in diameter and in weight it must not exceed twelve ounces.

In the case of the United Kingdom, the British Colonies of Hongkong, the Straits Settlements, the Union of South Africa, the Bechuanaland Protectorate and Rhodesia, a sample packet must not exceed two feet in length by one foot in width and one foot in depth, and in weight it must not exceed five pounds.

The conditions as to size and weight in the case of a sample packet addressed to Ceylon are the same as the conditions which apply to an inland pattern packet (see clause 67).

Note.—As regards the limits of weight for sample packets of spirits, tea and unmanufactured tobacco addressed to the United Kingdom see *Foreign Post Directory* included in this book.

181. *Payment of Postage.*—Postage on samples must be prepaid at least partly (in cases where full prepayment is not compulsory). Samples for any Union country, if not fully prepaid, will be charged on delivery with double the amount of the deficiency.

182. *Penalty for Breach of Conditions.*—Packets of samples which are not prepaid at least partly, or which contain letters or manuscript notes having the character of actual or personal correspondence, or which are not made up in the manner prescribed or which exceed the limits of weight and size fixed by clause 180, or which contain anything having a saleable value, or which in any other respect do not fulfil the conditions laid down in the preceding clauses, will not be forwarded.

(April, 1913.)

THE RUBBER INDUSTRY IN QUEENSLAND.

In the Annual Report of the Department of Agriculture, Queensland, for the year 1911-12 (just presented to both Houses of Parliament) appears the following on the rubber industry:—

"The demand for this product is so great and the cultivation of it so easy, provided one can afford to wait until the tree is productive, that more interest should have been taken in its cultivation, if only as a substitute, should it be necessary for a farmer to give up the cultivation of the sugarcane. Though the area under erop is not yet sufficient to arrest the attention of the Government statistician, it is no new thing here, the first plantation having been made by Messrs. Seymoure and Allan as far back as 1890 on the banks of the Mourilyan Harbour. Unluckily for them they chose the wrong variety, and their venture was destroyed by a hurricane. In 1898 this department imported plants, and has also received consignments on many occasions since, but no material interest has been taken in it, particularly in its natural country to the north of Mackoy, though rubber-growing trees are to be found on the coast from North to South of Queensland. At present it may be estimated that there are about fifty acres under Pará rubber cultivation, but this area, compared with the industry in New Guinea, is but infinitesimal. There, though the opportunities have been but of a much more recent date, the planters have begun to ship to Europe, while Queensland has lagged behind.

"It is now recognized by tropical agriculturists that the soil, climate, and rainfall in North Queensland are all that can be desired for the cultivation of rubber and cocoanuts. This is amply evidenced by the healthy appearance and rapid growth of such rubber trees as are planted at the Kamerunga State Nursery and elsewhere on the northern coast lands.

—*Tropical Life.*

SELECTED CUTTINGS.

Experiments in Manuring on a Tea Estate in Darjeeling.
by

CLAUD BALD,

Manager, Tukwar Co., Ltd., Darjeeling.

It is impossible on a hill garden to find a continuous block of land where the quality of the soil is exactly equal over any considerable area, as the undulations of the land of necessity divert some of the best constituents of the soil into the hollows from the ridges, more or less, during heavy rain.

The block which was selected for these experiments seemed to all appearance as nearly equal in quality throughout as it was possible to obtain; and yet the event proved that there was some difference in favour of one side. The land was carefully measured, and the straight lines of tea bushes made it easy to plot off accurately four plots, each measuring half an acre. They were numbered from one to four. The land is slightly better in the direction of No. 4, which has been kept as the check plot. In regard to cultivation, pruning and plucking, all the plots have been treated exactly alike; so that the experiments might determine the results of the manuring only. The experiments were continued for three years. The diagram opposite and its explanation indicate the treatment and the resulting crop of tea for each year. The cost of manuring is shown on page 160. It will be noted that no farmyard manure has been experimented with; the reason being that on the estate no grazing is permitted, and there are very few animals kept, hence natural manure is not available in any considerable quantity, and it has become necessary to consider whether chemical or artificial manures can be applied in such a way as to prove remunerative.

In the first year the object was to find out whether the application of *castor meal* would give any encouraging result. An exceptionally heavy dressing was given to plot No. 1, while half the quantity was given to No. 3, and No. 2 was treated with *green manure* only. The green manure was a crop of *dal* similar to what is known as *Mali Kalai*. The crop for the year was largest from No. 4, the untreated plot, indicating that the castor meal had practically no effect upon the out-turn, while the better soil in the direction of No. 4 asserted itself.

In the second year Nos. 1 and 3 were treated with *chemical manure*, but *without nitrogen*, except the small quantity contained in the castor meal on No. 1. The nitrogen was purposely omitted, as it was feared that this manure would tend to the production of rank leaf, making coarse tea. No. 4 was again almost the highest in quantity of produce, but it was beaten by No. 2, which had been treated for two years in succession with green manure only.

In the third year No. 1 was treated with a *complete chemical manure*, with the addition of a small dressing of castor meal. No. 2 again had *green manure* only; while No. 3 had an application of *animal meal*. The nitrogen applied to No. 1 (in the form of ammoniac), sent up the crop from that plot to the highest point; but it was closely followed by No. 2, which made an increase on its previous record. The check plot made rather less tea than in the previous year.

Some of the outstanding facts in connection with these experiments are the high cost of chemical and artificial manures in a remote district like Darjeeling, and the extreme doubtfulness of their economic utility; also the

possibility of using expensive manures while accomplishing practically no result, in consequence of the manure used not being of a suitable composition; then there is the special outstanding fact that while green manuring is the cheapest method, it produces remarkably satisfactory results. It may be noted that the manures were used in one application only, as the nature of the ground was such that it was not advisable to dig at all during the rainy season, for fear of losing soil by wash.

An important fact in connection with the green manuring is that the crop was not dug into the land in the green state. It was only sickled when it came to maturity, and left as a mulch upon the ground until the rains were over, when the rotting stuff was dug in. At the same time a similar quantity of ordinary jungle growth was dug into each of the other plots. It is probable that the rotting leguminous crop contained a larger proportion of nitrogen than the rotting jungle; but in any case it seems that the special benefit which accrued to plot No. 2 may be chiefly attributed to bacterial action on the roots of the leguminous crop.

The relative amount of crop having been determined as a result of the manuring, it remained to be seen whether there was any difference in the quality of the teas produced under the different circumstances. This is indeed the most important consideration of all on a hill garden, where the quality of the teas must of necessity be the first consideration. With a view to determining this a set of samples was carefully prepared from each plot, and reported upon by an expert. The valuations were 10½d., 11d., 9d. and 1s. per lb. of samples made from plots 1-4 respectively on 18th September, 1911. It has been felt, however, that in order to determine the real relative value it is necessary to have a series of samples drawn from the plots at stated intervals throughout the manufacturing season, as it is well-known that some of the chemicals are so evanescent that their effects upon the teas may be very great in the earlier part of the season, while other ingredients which only become absorbed by the plant after some months may have a very different effect upon quality towards the end of the season.

A digest of the results for the three years in crop and cost is as follows:--

	1909.	1910.	1911.	Total.
Tea per acre in	lbs.	lbs.	lbs.	lbs.
Plot No. 1 ...	247	265	345	857
" No. 2 ...	239	313	324	876
" No. 3 ...	258	270	312	840
" No. 4 ...	275	305	286	867

The cost of treatment works out as follows:--

	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Plot No. 1 ...	64 0 0	33 6 0	44 9 6	141 15 6
" No. 2 ...	4 9 0	4 9 0	4 9 0	13 11 0
" No. 3 ...	32 0 0	16 6 0	15 14 0	64 4 0
" No. 4 ...				
Check plot no expenditure.				

The total crop from No. 4 is comparatively high, because it stood relatively so high in the first year. Apart from the question of the relative quality of the teas produced, it will be seen that the extra crop from No. 3 is not sufficient to pay for the treatment which was given to it, while the cost of treatment to No. 1 is altogether prohibitive.—*The Agricultural Journal of India.*